Remarks

The Office Action mailed August 25, 2005 has been received and reviewed. No claims have been amended, cancelled or added. Therefore, the pending claims are claims 1-26. The "Office Action Summary" incorrectly lists the pending claims as claims 1-23. It is respectfully requested that this error be noted as claims 24-26 have not been cancelled in this application. Reconsideration and withdrawal of the rejections are respectfully requested in view of the remarks provided herein.

The 35 U.S.C. §103 Rejection

The Examiner rejected claims 1-7 and 14-20 under 35 U.S.C. §103 as being unpatentable over Stauffer et al. (Adaptive background mixture models for real-time tracking", Proceedings 1999 EEE Conference on Computer vision and Pattern Recognition, Fort Collins, Col., 1999 June 23-25; 2:246-252) in view of Menon et al. (U.S. Patent No. 5,537,488). Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. *See* M.P.E.P. § 2143.

Claims 1 and 14

Claim 1 describes a method for use in monitoring a search area that includes providing frames of image data representative of a search area with the image data including pixel value data for a plurality of pixels, and further providing a plurality of time varying distributions for each pixel based on the pixel value data. The method further includes providing at least one frame of update image data representative of the search area in an update cycle with the frame of image data comprising update pixel value data for each of the plurality of pixels. Yet further, the method includes attempting to match the update pixel value data for each pixel to each of all of

the plurality of time varying distributions provided for the pixel. The plurality of time varying distributions for each pixel are updated based on whether the update pixel value data matches one of the plurality of time varying distributions provided for the pixel and the updated plurality of time varying distributions for each pixel are ordered based on a probability of the time varying distributions thereof being representative of background or foreground information in the search area for use in determining whether the pixel is to be considered background or foreground information. Claim 14 is a system claim that includes limitations similar to those of claim 1.

The Examiner recognizes that Stauffer et al. does not describe each and every element of claim 1 or claim 14. For example, as recognized by the Examiner, Stauffer et al. does not attempt to match the update pixel value data for each pixel to each of all of the plurality of time varying distributions provided for the pixel and then update the plurality of time varying distributions for each pixel based on whether the update pixel value data matches one of the plurality of time varying distributions provided for the pixel. Rather, Stauffer et al. attempts to match the distributions one at a time and when a "supposed match" exists, then the matching process stops at the first distribution that meets the requirements for a match. As such, Stauffer et al. does not attempt to match update pixel value data for each pixel to each of all of the plurality of time varying distributions provided for the pixel and the update performed by Stauffer et al. may result in a model update that favors unjustly the wrong distribution. For a more detail comparison of Stauffer et al. and the present invention, please refer to the description in the pending application at page 37, line 25 through page 39, line 16.

However, the Examiner alleges that "Menon et al. teaches in the area of pattern recognition that a pattern should be compared to every category. And then the best match should be selected." The Examiner alleges that this "is the same concept as what is being described in the claimed invention." As such, the Examiner alleges that "it would have been obvious . . . to compare the update pixel value data to every distribution before declaring a match (as taught by Menon) in the method disclosed by Stauffer." The Examiner goes on to indicate that "[d]epending on the variance allowed in a match by Stauffer the first 'match' found could be far

from ideal. By checking through all of the distributions the best match can be found which will lead to more accurate results."

Applicants assert that the present invention as described in each of claims 1 and 14 is not obvious in view of the cited references for various reasons. For example, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Stauffer et al. with the teachings of Menon et al., and there is no indication that there would be a reasonable expectation of success if Stauffer et al. were modified as indicated by the Examiner.

In column 5 and 6, as cited by the Examiner, Menon et al. is concerned with the process of producing a set of training patterns. Menon et al. describes the determination of a correlation between pattern vectors and each existing category definition. The correlation is compared to a preset training threshold and if a category is found for which the correlation exceeds the threshold then the training pattern is added to the cluster of that category. If more than one category has a correlation above the threshold then the best match category is modified and the training pattern is added to that cluster. If no correlation is found to exceed the training threshold then a new category is formed. In other words, the correlations between pattern vectors and each existing category definition are used merely to sort training patterns into clusters of categories to provide category definition; thereafter, classification of input patterns (see column 7 and 8) is carried out using the category definitions. Such a purpose of the process described in column 5 and 6 of Menon et al. (i.e., to find the highest correlation so that the training pattern can be added to a cluster of the best match category) is quite unlike the present invention.

In the present invention, a search area is being monitored continuously and whether pixels are background or foreground information in the search area being monitored is determined. This is accomplished by employing the use of a plurality of time varying distributions for each pixel with the plurality of time varying distributions for each pixel being updated based on whether update pixel value data matches one of the plurality of time varying distributions provided for the pixel. The process of the present invention is quite different that of

Menon et al. which deals with the establishment of category definitions determined by sorting a set of training patterns for use in classification of input data such as photographs, voice data, etc. (see column 5 of Menon et al.).

For example, the training of Menon et al. is a precursor process that uses previously captured training data that is then sorted into categories for definition thereof. The present invention is a real time update process applied to frames of update image data for determination of whether pixels are foreground or background information of the scene being monitored. The training process described in Menon et al. in the columns 5 and 6 cited by the Examiner is not a real time updating process such as described according to the present invention or that described in Stauffer et al. As such, due to the nature and differences of the processes described in Menon et al. and Stauffer et al., and further based on the differences in the purposes of such processes, it cannot be considered obvious to select one isolated step from one process to be used in the other.

There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Stauffer et al. with the teachings of Menon et al. In addition, there is no indication that there would be a reasonable expectation of success in the substitution of an isolated step from the training process of Menon et al. for use in a real time update process such as that of Stauffer et al. As such, the rejected claims are not obvious in view of the cited references.

Applicants traverse the Examiner's position that "[d]epending on the variance allowed in a match by Stauffer the first 'match' found could be far from ideal" and that "[b]y checking through all of the distributions the best match can be found which will lead to more accurate results." Such a conclusory statement is not sufficient motivation or suggestion to apply such an isolated step described in Menon et al. to the process of Stauffer et al. With this line of reasoning, any knew improvement over a previously described process would be incapable of being patented. Surely this is not what the Examiner intends.

The updating of the plurality of time varying distributions according to the present invention is a substantial improvement over that described in Stauffer et al. As described in the specification of the pending application, the matching approach recited in the pending claims is

employed because the approach implemented by the normal mixture modeling reported in Stauffer *et al.* is not adequate in many circumstances, e.g., where monitoring is outdoors in an environment that features broken clouds due to increased evaporation from lakes and brisk winds; such small clouds of various density pass rapidly across the camera's field of view in high frequency. For example, this method is vulnerable (e.g., misidentifies pixels) in at least the following scenario. If an incoming pixel value is more likely to belong, for example, to a different distribution then one which was satisfied earlier in the queue, then the process stops before it reaches the right distribution and a match is declared too early. The match is followed with a model update that favors unjustly the wrong distribution. These cumulative errors can affect the performance of the system after a certain time period. They can even have an immediate and serious effect if one distribution happens to be background and the other foreground.

For example, the above scenario can be put into motion by fast moving clouds. In Stauffer *et al.*, when a new distribution is introduced into the system, it is centered around the incoming pixel value and is given an initially high variance and small weight. As more evidence accumulates, the variance of the distribution drops and its weight increases. Consequently, the distribution advances in the ordered list of distributions. However, because the weather pattern is very active, the variance of the distribution remains relatively high, since supporting evidence is switched on and off at high frequency. This results in a mixture model with distributions that are relatively spread out. If an object of a certain color happens to move in the scene during this time, it generates incoming pixel values that may marginally match distributions at the top of the queue and therefore be interpreted as background. Since the moving clouds affect wide areas of the camera's field of view, post-processing techniques are generally ineffective to cure such deficiencies.

Such a problem is not recognized in Stauffer et al. and clearly Menon et al. also does not recognize such a problem as the process described therein concerns sorting training data into categories. For the Examiner to allege that an isolated step from the training process of Menon et al. be inserted into the real time foreground and background segmentation process of Stauffer

et al. when no motivation or suggestion for such a modification exists, and particularly where an unrecognized problem is solved to provide a substantially improved process, is engagement in impermissible hindsight reconstruction of the claimed invention.

Applicants respectfully submit that the Examiner's reasoning is incomplete. As recently asserted in *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.* 411 F.3d 1332, 75 U.S.P.Q.2d 1051 (Fed. Cir. 2005), 35 U.S.C. §103 specifically requires an assessment of the claimed invention "as a whole." The "as a whole" assessment of the invention requires a showing that an artisan of ordinary skill in the art at the time of the invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the various elements from the cited references and combined them in the claimed manner. In other words, 35 U.S.C. §103 requires some suggestion or motivation, *before the invention itself*, to make the new combination. See *In re Rouffet*, 149 F.3d 1350, 1355-56, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998) (*Emphasis added*).

This "as a whole" instruction in 35 U.S.C. §103 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might successfully break an invention into its component parts, then find a reference corresponding to each component. This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components. Further, this improper method would discount the value of combining various existing features or principles in a new way to achieve a new result - often the essence of the invention. *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275, 69 U.S.P.Q.2d 1686, 1690 (Fed. Cir. 2004). This is clearly the situation in the present matter where the attempt to match the update pixel value data for each pixel to each of all of the plurality of time varying distributions provided for the pixel provides a substantially advantageous process.

Simply identifying the various elements of a claim in the cited reference does not render a claim obvious. *Ruiz*, 357 F.3d at 1275. Instead, 35 U.S.C. §103 requires some suggestion or motivation in the prior art to make the new combination. *In re Rouffet*, 149 F.3d at 1355-56. Applicants submit that the Examiner has engaged in an improper part by part analysis of the

claimed invention by selecting an isolated element of Menon et al. that is for a process substantially different that the real time foreground and background determination process of the present invention. Applicants submit that the requisite motivation to combine the teachings of the references to obtain the claimed invention, as a whole, is lacking.

For at least the above reasons, the rejected claims are not obvious in view of the cited references.

Claims 2-7 and 15-20

The rejected claims respectively depend on one of the independent claims 1 or 14, either directly or indirectly. Therefore, they include the limitations of the respective independent claim upon which they depend. either directly or indirectly. As such, these claims are also not obvious in view of the cited references for the same reasons as provided above for the claim or claims upon which they depend, and further by reason of their own limitations.

Claims 8-13 and 21-26

The Examiner rejected claims 8-10 and 21-23 under 35 U.S.C. §103(a) as being unpatentable over Stauffer in view of Sacks (U.S. Patent No. 4,739,401), and also in view of Menon et al. The Examiner rejected claims 11-12 and 24-25 under 35 U.S.C. §103(a) as being unpatentable over Stauffer in view of Baxter (U.S. Patent No. 5,966,074), and also in view of Menon et al. Further, the Examiner rejected claims 13 and 26 under 35 U.S.C. §103(a) as being unpatentable over Stauffer in view of Uyttendaele (U.S. Patent No. 6,701,030), and also in view of Menon et al. Applicants respectfully traverse such rejections.

As discussed above with reference to the alleged obviousness of claims 1 and 14, there is no motivation to combine Stauffer et al. and Menon et al. to obtain the claimed invention of claims 1 or 14. Further, the other references cited by the Examiner, do not cure the deficiencies of such references. Therefore, such claims are not obvious in view of the cited references for at least the same reasons as described above with reference to claims 1 and 14, and by reason of their own limitations. It is respectfully requested that the rejection of such claims be withdrawn.

Summary

It is respectfully submitted that the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

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CERTIFICATE UNDER 37 CFR §1.8:
The undersigned hereby certifies that the Transmittal Letter and the paper(s), as described hereinabove, are being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to **Mail Stop Amendment**, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 28 day of Dec, 2005, at 9:50 A.M. (Central Time).

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